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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/697,371	10/29/2003	Steven E. Muentert	M-15282 US	7886

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EXAMINER

LIVEDALEN, BRIAN J

ART UNIT PAPER NUMBER

2878

DATE MAILED: 08/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/697,371

Applicant(s)

MUENTER, STEVEN E.

Examiner

Brian J. Livedalen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 10-13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 8, 9 and 14-24 is/are rejected.
- 7) ☐ Claim(s) 6 and 7 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>10/29/03</u> | 6) <input type="checkbox"/> Other: ____  |

**DETAILED ACTION**

***Election/Restrictions***

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-9 and 14-24, drawn to measurement device, classified in class 250, subclass 231.13.
- II. Claims 10-13, drawn to grating, classified in class 250, subclass 237G.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the structure of the claims sets forth in invention I is patentable based on the relationship between the acousto-optic modulator, a non-specific grating, and a photodetector. The properties of the invention II are not necessary for the patentability of invention I. The subcombination has separate utility such as an encoder for other types of position measuring devices not employing a frequency modulator.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

During a telephone conversation with Greg Michelson on August 4<sup>th</sup> 2005, a provisional election was made with traverse to prosecute the invention of measurement device, claims 1-9, 14-24. Affirmation of this election must be made by applicant in replying to this Office action. Claims 10-13 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 14-21 and 23 are rejected under 35 U.S.C. 102b as being anticipated by Stanton et al. (5654540).

In regard to claims 14-19, Stanton discloses (fig. 1) a method of receiving a laser beam, directing the laser beam (17) to provide two or more spatial frequencies; passing the laser beams with the spatial frequencies through a multi-pitch grating (11), wherein the grating has a sinusoidally-modulated amplitude grating having two or more spatial frequencies (fig. 8, 85), to provide one or more output laser beams with encoded position information; and decoding (computer, column 5, lines 13 and 14) the one or more output laser beams to determine absolute position measurement of the grating (column 2, lines 19-25); wherein the grating can also be attached to an object (18)

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(column 3, lines 13-15). Stanton further discloses converting the one or more output beams to an electrical signal whose phase information corresponds to the position of the grating and the two or more spatial frequencies of the laser beam also has corresponding temporal frequencies (column 5, lines 1-25).

In regard to claims 20, 21, and 23 Stanton discloses (fig. 8) a grating having two or more pitches with respective sinusoidally-modulated spatial frequencies (85), an acousto-optic modulator (17) to provide to the grating one or more laser beams with spatial frequencies corresponding to one or more of the pitches of the grating; and means for decoding (computer, column 5, lines 13 and 14) an output laser beam resulting from the one or more laser beams passing through the grating to provide one or more output signals, wherein the one or more output signals provide position information of the grating (column 5, lines 1-25).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5, 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Magome et al. (4710026) in view of Stanton et al. (5654540).

In regard to claims 1, 4, 8, and 9 Magome discloses (fig. 1) an acousto-optic modulator (2) adapted to receive a laser beam from a laser (1) and modulates the laser

beam based upon one or more frequencies of a received input signal to generate one or more modulated laser beams, wherein the input signal is comprised of one or more signals corresponding to one or more of the frequencies. A photodetector (7) adapted to receive the output laser beam and provide an output signal; at least one filter adapted to filter the output signal at one or more of the frequencies of the input signal and provide a corresponding output signal (column 3, lines 39-41); at least one phase detector adapted to determine a phase difference (8) between a phase of the filtered output signal and a phase of a corresponding one of the signals of the input signal, wherein the phase difference corresponds to a position measurement of the grating. Magome remains silent regarding the pitch being a multi-grating pitch. Stanton discloses (fig. 8) a multi-pitch grating (85), having a sinusoidally-modulated amplitude grating having two or more simultaneous spatial frequencies and has two or more separate gratings on one substrate, in a position detecting device using an acousto-optic modulator (column 9, lines 55-60). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the multi-pitch grating of Stanton to the measurement device of Magome in order to maintain absolute position measurement over an entire period of the grating.

In regard to claims 2 and 3, Magome in view of Stanton discloses a measurement device as set forth above. Magome in view of Stanton is silent regarding a lens between the modulator and the grating. However, Stanton further discloses (fig. 7) a lens (74), wherein the lens recombines a zero order diffraction laser beam and at least on first order diffraction beam from the acousto-optic modulator onto the multiple-

pitch grating (column 6, lines 48-65). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the lens in order provide a single beam onto the grating.

In regard to claims 5, Magome in view of Stanton discloses an input signal including a first signal having a first frequency and a second signal having a second frequency and filters that are centered at the two respective frequencies in order to provide two output signals (column 5, lines 39-45); a phase detector adapted to prove a first phase difference between the first filtered output signal and the first signal.

Magome in view of Stanton remain silent regarding a second phase detector however, it would be a matter of routine skill to add a second phase detector. It would have been obvious to one of ordinary skill in the art to add a second phase detector if to measure in two dimensions as set forth above.

Claims 20, 22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Magome et al. (5489986), hereinafter Magome'986 in view of Stanton et al. (5654540).

Regarding claims 20, 22 and 24, Magome'986 discloses (fig. 1) two modulators (12) for providing to the grating one or more laser beams with spatial frequencies corresponding to one or more of the pitches of the grating; and means for decoding (40, 41) an output laser beam resulting from the one or more laser beams passing through the grating to provide one or more output signals, wherein the one or more output signals provide position information of the grating. Magome'986 further discloses a

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photodetector adapted to convert the output laser beam to an electrical output signal and at least one filter (23) to filter the output signal and at least one phase detector to determine the position information of the grating based upon a phase relationship of the output signal (column 19). Magome'986 remains silent regarding the pitch being a multi-grating pitch. Stanton discloses (fig. 8) a multi-pitch grating (85) in a position detecting device using an acousto-optic modulator (column 9, lines 55-60). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the multi-pitch grating of Stanton to the measurement device of Magome'986 in order to maintain absolute position measurement over an entire period of the grating.

#### ***Allowable Subject Matter***

Claims 6 and 7 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: prior art fails to disclose or make obvious the measurement device having an acousto-optic modulator and a multi-pitch grating in which the device inputs the summation of two frequencies from independent signals and then later takes the difference between the correlating phase difference signals to provide absolute position measurement.

#### ***Conclusion***




Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian J. Livedalen whose telephone number is (571) 272-2715. The examiner can normally be reached on 8:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

bjl



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